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BE IT KNOWN that We, **Sam ZHADANOV** and **Eli  
ZHADANOV** have invented certain new and useful improvements in

**CLEANING DEVICE WITH DISPOSABLE CLEANING ELEMENT**

of which the following is a complete specification:

BACKGROUND OF THE INVENTION

The present invention relates generally to cleaning devices which can be used as a mitt, a mop head, an attachment to water cleaning systems, etc.

Cleaning devices of the above mentioned general type are known in the art. Known cleaning devices are usually formed as disks. One of such known devices is disclosed in our U.S. patent 5,842,250. In the known cleaning devices when the cleaning element becomes dirty, the whole device becomes inoperative and cannot be used again. It is believed that this device can be further improved.

### SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a cleaning device which is a further improvement of the existing cleaning devices.

In keeping with these objects and with others which will become apparent hereinafter, one feature resides, briefly stated, in a cleaning device which has a cleaning element having an axis, an axial inner region and an axial outer region and being formed so that at least said axially outer region is bendable to follow a shape of a surface to be cleaned when pressed against the surface; a holding element which is substantially more rigid than said cleaning element so as to hold said cleaning element; and a connecting element which releasably connects said cleaning element to said holding element so that after use of said cleaning element said cleaning element can be disconnected from said holding element and removed.

When the cleaning device is designed in accordance with the present invention, the cleaning element after use can be easily removed from the holding element, and then can be replaced by a new cleaning element, or cleaned and again installed in the cleaning device for further use.

The novel features which are considered as characteristic for the present invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a view showing a cross-section of a cleaning device in accordance with the present invention;

Figure 2 is a bottom view of the cleaning device in accordance with the present invention, and

Figure 3 is a view showing a cleaning element in its initial position.

### DESCRIPTION OF THE PREFERRED EMBODIMENTS

A cleaning device in accordance with the present invention has a cleaning element which is identified as a whole with reference numeral 1. The cleaning element 1 is formed substantially as a disc having a central axis 2. The cleaning element 1 has an axially outer region 3 and an axially inner region 4 with respect to the axis 2. At least the axially outer region 3 is elastic so that it can follow a shape of a surface to be cleaned when pressed against the surface. For this purpose at least the axially outer region 3 can be provided with a plurality of slots 5 which can extend from an outer circumferential edge of the cleaning element 1 toward the axis 2.

The cleaning device further has a holding element which is identified as a whole with reference numeral 6. The holding element 6 is provided with a central portion 7 which is preferably tubular and has a central throughgoing opening 8, and also has a peripheral portion 9. The peripheral portion 9 can be substantially conical. The holding element 6 is designed to hold the cleaning element 1. In particular, the peripheral portion 9 of the holding element 6 holds the axially inner region 4 of the cleaning element 1. The holding element 6 is substantially more rigid than the cleaning element 1, to provide an adequate holding action.

The cleaning device in accordance with the present invention further has a connecting element which is identified as a whole with reference numeral 10. The connecting element 10 is designed so that it releasably holds the cleaning element 1 on the holding element 6 so that the cleaning element 1 after use can be released from the holding element 6 and removed, and thereafter a new cleaning element can be again attached to the holding element 6 or the same cleaning element can be cleaned and again attached to the holding element. In the shown embodiment the connecting element 10 has a portion which is identified with reference numeral 11. The portion 11 of the connecting element 10 directly contacts the axially inner region 4 of the cleaning element 1 and is located between the axially inner region 4 of the cleaning element 1 and the peripheral portion 9 of the holding element 6.

The connecting element 10 has projection means which is identified with reference numeral 12. The projection means 12 can be formed by a plurality of projections which are spaced from one another in a circumferential direction and located at a certain radial distance or distances from the axis 2. The portion 9 of the holding element 6, in turn, is provided with opening means 13, with which the projection means 12 are engageable. The opening means 13 can be formed by a plurality of throughgoing

openings which are similarly spaced from one another in a circumferential direction and located at a certain radius or radii from the axis 2. The connecting element 10 further has a annular rim 14 which extends transversely to the portion 11 and can be flexible.

As can be seen from Figure 1, the cleaning element 1 has an additional portion 15 which can be bent over the connecting element 10 to extend in an opposite direction along the axially inner region 4 between the portion 11 of the connecting element 10 and the portion 9 of the holding element 6. In order to allow bending of the portion 15, it is provided for example with a plurality of slots 16 extending from the center of the cleaning element 1, in an initial position of the cleaning element, radially outwardly.

The cleaning element 1, and in particular its portion 15 is provided with opening means which can include a plurality of openings 17 substantially corresponding to the openings 13 of the portion 9 of the holding element 6. As can be seen from Figure 2, in the initial position of the cleaning element 1 it can be formed as a flat disc provided with the axially outer region 3, the axially inner region 4, the portion 15, the slots 16 and the openings 17.



In order to assemble the device, the portion 15 of the cleaning element 1 is bent as shown in Figure 1, around the portion 11 of the connecting element 10 so that the projections 12 of the connecting element 10 extend through the openings 17 of the cleaning element 1. Then the projections 12 are passed through the openings 13 of the portion 9 of the holding element 6 and the rim 14 engages over the outer peripheral edge of the portion 9 of the holding element 6, for example with snap action, thus providing a complete assembly of the cleaning device.

After a corresponding use and dirtying of the cleaning element 1, it can be removed from the cleaning device by pulling the cleaning element 1 together with the connecting element 2 from the holding element 6 so that the rim 14 of the connecting element 2 disengages from the peripheral edge of the holding element 6. Then the cleaning element 1 is removed from the projections 12 of the connecting element 10. A new cleaning element 1 can then be attached to the connecting element 2 and connected with the holding element 6 in a reversed order. It is also possible to clean dirtied cleaning element 1, and then to attach it to the connecting element and connect with the holding element, to use it again.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a cleaning device, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.